

CGRO CYCLE6 FINAL REPORT

This document provides the fourth quarter and final reports for the Cycle 6 Guest Investigation:
THE CALIBRATION OF THE BATSE SPEC DETECTORS

- ☐ Dr. Richard A. Schwartz
- ☐ RaytheonITSS
- ☐ Code 682
- ☐ NASA/GSFC
- ☐ 22 June 1999

Introduction

This contract supported several interrelated tasks. The first was the calibration of the BATSE SPECTroscopy detectors by comparison with known spectra. The second project was the installation and support of software to enable routine analysis of BATSE data. The third project was the support of several scientific investigations utilizing BATSE flare data.

1. Calibration of the SPECTROSCOPY Detectors

Nominally, the BATSE Spectroscopy (SPEC) detectors are well suited to making observations of solar hard X-ray bursts with an energy resolution superior to that of other space-based instruments. Moreover, their sensitivity is quite high in the 10-30 keV range, which is often unmeasured due to the requirements of the dynamic range of flares to be measured. Nonetheless, there have been important issues preventing full use of the BATSE high-resolution detector data within this energy range obtained during solar flares. Generally the problem is a disagreement between the predicted and measured fluxes in this energy range. This disagreement is manifest in frequent spectral features too fine for the instrumental resolution and 30-50% relative error between SPEC modules observing the identical flux. .

We undertook three inter-calibration studies during this contract to help resolve these problems although we failed to come to a final conclusion. The first was to use spectra obtained with the Yohkoh Hard X-ray Telescope (HXT) in its 64 channel spectroscopy mode. The study verified

the performance of the HXT as a well-calibrated instrument and started comparisons with the BATSE spectra. Data from the X-ray detector on NEAR was also used to validate the broadband low energy response of the SPEC detector. We also studied the implementation of a self-calibration procedure for the SPEC response by seeking a predictable and smooth count rate with the diffuse cosmic X-ray background as the input spectrum. None of these investigations has yet led to a reliable calibration of the SPEC detectors to date.

2. Software Support and Installation

Several investigators have requested support in using the IDL software and databases developed at the Solar Data Analysis Center to analyze BATSE data. Mainly they required support in using and installing the routines in the SPEX package, a part of the Solar Software (SSW) distribution. In particular, Josef Khan of Mullard Space Science Laboratory and working in Japan as part of the Yohkoh team received support. Also, Gerhard Rank working with the Comptel team at University of New Hampshire requested and received support under this contract.

3. Scientific Investigations Supported

One paper was completed, with the effort spread over several CGRO GI cycles. The paper appeared in *Astronomy and Astrophysics*, volume 342, page 575, "Hard X-ray and gamma-ray observations of an electron dominated event associated with an occulted solar flare." The authors are Vilmer, N.; Trottet, G.; Bara, C.; Schwartz, R. A.; Enome, S.; Kuznetsov, A.; Sunyaev, R., and Terekhov, O.

We also supported interpretation of BATSE data for investigations by L. Klein of the Paris Observatory, G. Trottet of the Paris Observatory, H. Nakajima of the Nobeyama Observatory, and Dr. Alexandre Altyntsev.

REPORT DOCUMENTATION PAGE

Form Approved

OMB No. 0704-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.

1. AGENCY USE ONLY (Leave blank)		2. REPORT DATE June 1999	3. REPORT TYPE AND DATES COVERED Contractor Report	
4. TITLE AND SUBTITLE Final Report - CGRO Cycle6			5. FUNDING NUMBERS	
6. AUTHOR(S) R. Schwartz				
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS (ES) Raytheon STX Corp. 4400 Forbes Boulevard Lanham, MD 20706-4392			8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS (ES) National Aeronautics and Space Administration Washington, DC 20546-0001			10. SPONSORING / MONITORING AGENCY REPORT NUMBER CR-1999-209880	
11. SUPPLEMENTARY NOTES Technical Monitor: J. Norris, Code 660.1				
12a. DISTRIBUTION / AVAILABILITY STATEMENT Unclassified - Unlimited Subject Category: 74 Report available from the NASA Center for AeroSpace Information, Parkway Center/7121 Standard Drive, Hanover, Maryland 21076-1320			12b. DISTRIBUTION CODE	
13. ABSTRACT (Maximum 200 words) This is the final report covering the contract that supported several interrelated tasks. The first was the calibration of the BATSE SPECTroscopy detectors by comparison with known spectra. The second project was the installation and support of software to enable routine analysis of BATSE data. The third project was the support of several scientific investigations using BATSE flare data.				
14. SUBJECT TERMS BATSE, spectroscopy, flare data			15. NUMBER OF PAGES 3	
			16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT Unclassified	18. SECURITY CLASSIFICATION OF THIS PAGE Unclassified	19. SECURITY CLASSIFICATION OF ABSTRACT Unclassified	20. LIMITATION OF ABSTRACT UL	